

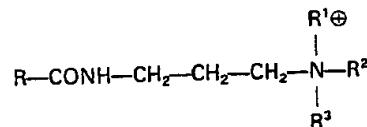
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(54) Hair and fabric conditioning preparation

(57) A conditioning and softening preparation for treating fabrics and hair comprises a solution of fatty amide-amine quaternary compound which can be easily diluted with cold water. Typical quaternary compounds have the formula:



wherein R is a C₁₇₋₃₅ alkyl group, and R¹, R² and R³ are optionally substituted alkyl, aryl or aralkyl groups. The compositions may constitute a hair shampoo together with a suitable detergent.

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SPECIFICATION
Conditioning Preparation

This invention concerns a conditioning, which is to say softening, preparation for application to the hair or skin or for domestic use on fabrics.

5 Generally, the active ingredient in known hair or skin conditioning preparations comprises a fatty amine quaternary compound. Such compounds are normally solid or paste-like at room temperatures 10 and must be emulsified using an appropriate agent in hot water to form a product of sufficiently low viscosity for bottling in a form suitable for use in the salon or home.

15 The present invention is based on the discovery that the fatty amide-amine quaternary compounds have broadly comparable properties for the conditioning of human hair or skin and can be readily diluted in water if necessary with use of a suitable solvent such as iso-butyl alcohol.

20 Thus, according to the present invention, there is provided a conditioning preparation comprising a solution of fatty amide-amine quaternary compound which can be easily diluted with cold water.

25 The viscosity of preparation may be increased as desired by the addition of common salt—compared with the addition of a relatively costly thickening agent, such as carboxy methyl cellulose, to the conventional fatty amine quaternary compounds.

30 Generally the preparation will include colouring agents, a perfume and possibly an opacifier or pearlising agent such as ethylene glycol mono stearate, for example.

If desired a cleansing agent may be added to 35 produce a "liquid soap" or "shampoo".

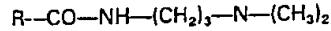
One cleansing agent may be an anionic compound such as an alkyl ether sulphate, an alkyl alcohol sulphate, or a sulpho-succinate derivative, for example.

40 Since the cationic quaternary compound and anionic compound may react to limit foaming—a customary desirable attribute of this kind of preparation—a foaming agent such as an amphoteric or amine oxide may be added.

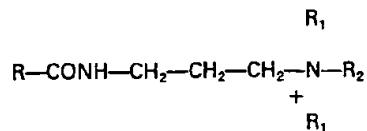
45 Another cleansing agent may be an amide-amine betaine or sultaine, for example, which, being fully compatible with the quaternary compound, may be admixed in desired proportion to produce a preparation of desired characteristics.

50 The invention will be further apparent from the following description which concerns, by way of example only, a number of compounds which may be utilised in its practice.

The quaternary ammonium compound utilised in 55 the present composition is of the type derived from amide-amines having the formula



where R—CO is a fatty acid residue ranging from 10 to 18 carbon atoms. The resulting amide-amine 60 quaternary ammonium compound has the following general formula



A preferred quaternary ammonium compound for use in the present invention is the stearamidopropyl

65 dimethyl hydroxypropyl quaternary ammonium compound where R=C₁₇H₃₅, R₁ is CH₃ and R₂ is 2-hydroxy propyl. A further preferred quaternary ammonium compound for use in accordance with the present invention is the stearamidopropyl 70 dimethyl benzyl quaternary ammonium compound where R is C₁₇H₃₅, R₁ is CH₃ and R₂ is a benzyl group. Although these two quaternary ammonium compounds are preferred, many other possible amide-amine quaternary ammonium compounds 75 may also be used in a conditioning preparation of the present invention. For example, R₂ may include other groups such as lower alkyl groups having 1 to 4 carbons, hydroxy substituted alkyl groups, aralkyl groups other than benzyl such as tolyl and xylyl and 80 also dihydroxy substituted alkyl groups.

Examples of preparation of suitable compounds follow.

Benzyl Quaternary Compound

1. To an aqueous suspension of 350 parts by 85 weight of Stearamido-propyl Dimethylamine in 800 parts water, add slowly benzyl chloride to 125 parts, stirring at a temperature of 75 to 85°C. After all the benzyl chloride is added, slowly raise the heat to 90°C continuing stirring until no further benzyl 90 chloride odour is detectable (about 2 hours).

2. To test for unreacted benzyl chloride: take 1cc of mixture and add 0.1 normal silver nitrate until precipitation of silver chloride ceases. Note the quantity of silver nitrate required.

95 3. To another cc of the mixture add 5cc sodium hydroxide (0.1 normal) and heat for 30 minutes at 95°C. Cool and add nitric acid bringing ph to 7. Add 0.1 normal silver nitrate until precipitation of silver chloride ceases. This should require about the same 100 quantity as in step 2. If more than 0.06cc of excess silver nitrate is required in step 3 as compared to step 2, there is excess unreacted benzyl chloride. The Benzyl Quaternary solution should be 37% active.

Hydroxypropyl Quaternary Compound

1. To the same suspension as in step 1 above, bubble in 56 parts by weight propylene oxide gas using a closed vessel with air displaced by nitrogen. Maintain temperature at 75°C for one hour.

110 2. Cool and add 57% active glycolic acid until ph 7 is reached. This should require 133 parts by weight. The achievement of neutrality is an adequate control check. Hydroxypropyl Quaternary should be 36% active.

115 If Stearamidopropyl Dimethylamine is not available, it may be prepared as follows:—

1. By weight: 270 parts Stearic Acid, 100 parts DMPA (Dimethylamino propylamine).
2. Charge into reaction kettle fitted with heating

elements (steam coil high pressure or otherwise). Heat to 140°C to 150°C and react for 3 hours. This will expel most of the water along with some amine. Then slowly allow the temperature to rise to 165°C 5 to 170°C and hold for one hour completing the reaction.

A reflux condenser or partial reflux condenser is helpful in producing high yields. In large quantities, the water mixture can be collected and worked up 10 for amine.

3. Following completion of the reaction, it is desirable to cool the mixture to 120°C and stir under a partial vacuum of 20mm to 50mm of mercury to evacuate any residual amine. Nitrogen purging or 15 steam stripping in vacuo will also accomplish this.

4. To test for unreacted Stearic acid: In a 50% alcohol solution (20cc) with phenol phthalein as indicator, add sodium hydroxide until a faint pink colour is evident. Next, dissolve 0.5 grams of 20 mixture (colour should disappear). No more than 1cc of 0.1 normal sodium hydroxide solution should bring back the pink colour or there is excess unreacted Stearic acid.

In one conditioning shampoo embodying the 25 invention the quaternary compound is admixed with an amide-amine betaine derived from an amide-amine. It is of the type

$$\begin{array}{c}
 \text{R}_1 \\
 \text{R}-\text{CONH}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{N}^+-\text{CH}_2-\text{COO}^- \\
 \quad \quad \quad + \\
 \quad \quad \quad \text{R}_1
 \end{array}$$

where R—CO is a fatty acid residue ranging from 10 30 to 18 carbon atoms and where R₁ is a lower alkyl radical ranging from 1 to 3 carbon atoms.

Because of the compatibility of the amide-amine betaine and amide-amine quaternary ammonium compounds, the concentration of a quaternary 35 ammonium compound can be varied from 1 to 30% by weight. In prior art shampoos, quaternary ammonium compound levels were necessarily kept low not only because of incompatibility of the detergent compounds, but also due to eye irritation 40 and possible damage from high quaternary ammonium compounds concentrations. In the present invention, however, the amide-amine quaternary ammonium compounds are less irritating than prior quaternary ammonium 45 compounds used in shampoo formulations, and their irritating effects are moderated by the amide-amine betaine thereby allowing the use of higher concentrations without the dangers of possible eye irritation and damage.

50 The conditioning shampoo composition of the present invention is highly compatible with hard waters and will even foam quite well in sea water. In addition, any biocidal activity which the amide-amine quaternary ammonium compounds have is 55 not destroyed or otherwise compromised in the presence of the amide-amine betaine compounds. Furthermore, the use of the amide-amine betaine, which is also well absorbed on most surfaces, regulates any build-up of overconditioning which

60 can take place if strong quaternary conditioners alone are used separately either on hair or textile fibres.

The preferred concentrations of amide-amine betaine and amide-amine quaternary ammonium 65 compound is from between 1 to 30% of each compound. These compounds are dissolved in water to form an aqueous solution thereof. If desired, standard shampoo additives may also be included to enhance certain other shampoo 70 characteristics for example, to increase or decrease viscosity, coconut diethanol amide may be added in concentrations ranging from 1 to 5% by weight. In addition fragrances may be added if desired without deleteriously affecting the shampoo composition.

75 Examples of shampoos or bath preparations based on the amide-amine type of betaines and quaternary are as follows:—

Coco amido betaine	10 parts w/w
Amide-amine stearic benzyl quaternary	6 parts w/w
Coconut diethanolamide	3 parts w/w
Perfume	q.s.
Distilled or deionized water	81 parts w/w

85 While the above formulation may be regarded as suitable for average hair, a particularly dry hair which is fine and long may be better served with the following formulation affording greater conditioning action:—

Coco amido betaine	8 parts w/w
Amide-amine stearic benzyl quaternary	10 parts w/w
Coconut diethanolamide	3 parts w/w
Perfume	q.s.
Distilled or deionized water	79 parts w/w

For maximum conditioning of very dry hair, the amount of quaternary ammonium compound can be increased to 30 parts by weight. Accordingly, for 100 maximum cleaning, the betaine concentration may be increased to 30 parts by weight. For very oily hair, the amount of quaternary may be reduced to low levels or near 1 part by weight.

Another example in which sulfobetaine or 105 sulfaines are used with a different quaternary compound is as follows:—

Amide-amine coco sulfaine	10 parts w/w
Amide-amine palmitic hydroxy-propyl quaternary	5 parts w/w

	Coconut diethanolamine	2 parts w/w	
	Deionized water	83 parts w/w	
Further examples of shampoos or bath preparations based on different types of amide-amine betaines and quaternary compounds are as follows:—			
5	Amide-amine lauric betaine	10 parts w/w	
10 Amide-amine stearic benzyl quaternary			
15	Coconut diethanolamide	2 parts w/w	
	Perfume	q.s.	
	Distilled or deionized water	81 parts w/w	
20	15 A formulation for particularly dry hair which is fine and long is:—		
25	Amide-amine myristic betaine	8 parts w/w	
30	Amide-amine stearic hydroxy-propyl quaternary	10 parts w/w	
35	As is apparent, the relative amounts of detergent (betaine) and conditioner (quaternary ammonium) may be varied widely to achieve many different desirable characteristics. The two compounds are in all respects fully compatible. This is particularly advantageous for large scale production of hair shampoos, since a wide variety of shampoos for dry through oily hair may be formulated by simply varying the relative amounts of the betaine and quaternary ammonium compounds. This foregoes the need for constant changing of equipment and chemicals to produce shampoos with different conditioning qualities. Although it is preferred that the quaternary ammonium compound be an amide-amine derivative, this is not absolutely necessary with possible conditioning shampoo compositions including an amide-amine betaine in combination with a quaternary compound.		
40	40 It will be appreciated that it is not intended to limit the invention to the above example only, many variations, such as might readily occur to one skilled in the art, being possible, without departing from the scope thereof as defined by the appended claims.		
45	45 Thus, for example, other additives such as Coco amido amine lactate may be included if desired.		

CLAIMS

1. A conditioning preparation comprising a solution of fatty amide-amine quaternary compound which can be easily diluted with cold water.
2. A conditioning preparation according to claim 1 wherein the quaternary ammonium compound utilised is of the type derived from amide-amines
- 55 having the formula
$$R-CO-NH-(CH_2)_3-N-(CH_3)_2$$

where R-CO is a fatty acid residue ranging from 10 to 18 carbon atoms.

- 3. A conditioning preparation according to claim 2
$$60 R-CONH-CH_2-CH_2-CH_2-N-R_2 + R_1$$

wherein the amide-amine quaternary ammonium compound has the following general formula
- 4. A conditioning preparation according to claim 3
$$65 stearamidopropyl dimethyl hydroxypropyl quaternary ammonium compound where R=C_{17}H_{35}, R_1 is CH_3 and R_2 is 2-hydroxy propyl.$$
- 5. A conditioning preparation according to claim 3
$$70 stearamidopropyl dimethyl benzyl quaternary ammonium compound where R is C_{17}H_{35}, R_1 is CH_3 and R_2 is a benzyl group.$$
- 6. A conditioning preparation according to any preceding claim wherein the viscosity of the
- 75 preparation is increased by the addition of common salt.
- 7. A conditioning preparation according to any preceding claim including colouring agents.
- 8. A conditioning preparation according to any preceding claim including a perfume.
- 9. A conditioning preparation according to any preceding claim including an opacifier or pearlising agent.
- 10. A conditioning preparation according to claim
$$85 9$$

wherein said opacifier is ethylene glycol mono stearate.
- 11. A conditioning preparation according to any preceding claim including a cleansing agent.
- 12. A conditioning preparation according to claim
$$90 11$$

wherein said cleansing agent is an anionic compound such as an alkyl ether sulphate, an alkyl alcohol sulphate, or a sulpho-succinate derivative.
- 13. A conditioning preparation according to claim
$$95 12$$

including a foaming agent such as an amphoteric or amine oxide.
- 14. A conditioning preparation according to claim
$$11$$

wherein said cleansing agent is an amide-amine betaine or sultaine.